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ABSTRACT

In light of evidence indicating that referral itself often predicts student placement, an expert system was designed to assist educators to reduce bias in the process of referring students with suspected disabilities. A preliminary review of the literature looks at teacher perceptions as a predictor of handicapping conditions, referral bias, and placement as a measure of handicapping conditions. The Referral Consultant expert system asks a series of questions which quickly assess, first, whether the student is an obvious candidate for special education referral, and then, if not, the student's academic achievement and learning problems, possible handicapping conditions to account for the learning problems, other difficulties possibly accounting for the learning problems, and whether pre-referral interventions have been attempted. The output is a report describing its conclusions as to whether the student should be referred for special education assessment. The system was evaluated in 18 elementary schools. Implementation of the system had no statistically significant impact on the percentage of students referred for special education, or the ratio of students placed to students assessed. Additionally, variables predicting referral for special education assessment were not consistent. Another report detailing the Referral Consultant logic, questions, and output is attached. (21 references) (DB)

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REFERRAL CONSULTANT

Final Report

Problem Statement

Introduction

Techniques used by schools to conduct referral and placement procedures have a significant impact in determining who will receive special education services. Ideally, referral procedures should include specific criteria to be considered in deciding if a student should be assessed. Those criteria should be accurate predictors of the presence of a handicapping condition. Such a set of predictive referral criteria would ensure that costly assessment resources are used judiciously. Similarly, assessment procedures should be tied to specific state and federal guidelines that lead to the identification of students with specific handicapping conditions and placement in special education programs that foster the development of those students.

In recent years, much research has been directed toward investigating the special education referral/assessment/placement process. However, the available data provide less than a complete understanding of that process. The following review is aimed at summarizing current literature describing the referral/assessment/placement process. This review will lead to the identification of important questions which have not been considered.

Teacher Perceptions as a Predictor of Handicapping Conditions

As noted, referral data should predict the presence of handicapping conditions. Unfortunately, referral procedures vary widely from state to state and school district to school district. There is a paucity of data on what referral information is typically collected and how well that information predicts the presence of handicapping conditions. For the most part, referral for special education assessment seems to be based on teacher concerns and perceptions that are not well specified. For example, Ysseldyke, Christenson, Pianta, and Algozzine (1983) in studying teachers' reasons for referral concluded they were generally stated in vague and nebulous terms.

Recently, Gerber and Semmel (1985) have suggested that teacher perceptions are good predictors of placement in special services. These researchers had ten teachers in a rural school

serving kindergarten through eighth grade students, rate 266 students on a variety of characteristics. During the school year, 11 students were referred for special education and 9 ultimately received special education or other remedial services. Further, it was found that teacher ratings of students, particularly those on need for supervision, academic potential, and ease of teaching, were predictive of which students would be referred. Referred students generally had the lowest ratings in their classes.

Data supplied by Shinn, Tindal, and Spira (1987) also suggest that teacher perceptions are predictive of the need for special services. These researchers established reading norms for a large midwestern city. They then used curriculum-based assessment procedures to assess reading achievement in 570 second through sixth grade students referred for difficulty in reading. Referred students were consistently found to have lower than average reading achievement.

Referral Bias

Although both Gerber and Semmel's (1985) and Shinn, Tindal, and Spira's (1987) studies suggest that teachers' perceptions may be good predictors, both qualify their results by presenting data indicating that such perceptions are less than perfect predictors and are biased. In the former study, although referred students tended to have the lowest teacher ratings in their classes, their ratings were not necessarily the lowest ratings in their schools. Further, having a low rating did not always predict referral and when teachers referred students who were not rated lowest, mitigating or biasing factors were identified. These included: 1) the need for a high level of supervision, 2) having several previously identified handicapped students in the classroom, and 3) having many low rated students in the classroom and high variability in class ratings. Similarly, Shinn, Tindal, and Spira (1987) found sex and ethnicity to be biasing factors in referral, with larger percentages of male and black students being referred than would have been predicted from population base rates of reading achievement.

Numerous other studies have also examined bias in the referral process. These can be divided into those that examined student, teacher, class, and system characteristics.

Student characteristics. Student characteristics that have been shown to bias the referral process include: 1) sex - males are more likely to be referred than females (Mendelsohn & Jennings, 1986; Sevick & Ysseldyke, 1986; Kelly, Bullock & Dykes, 1977), 2) ethnicity - black and low socio-economic status (SES) Mexican Americans are more likely to be referred than whites (Argulewicz & Sanchez, 1983; Mendelsohn & Jennings, 1986), 3) attractiveness - unattractive students are more likely to be referred than attractive students (Ross & Salvia, 1975; Ysseldyke, Algozzine, Regan, & McGue, 1981) and SES - low SES

students are more likely to be referred than high SES students (Argulewicz & Sanchez, 1983; Ysseldyke, Algozzine, Regan, & McGue, 1981).

Teacher characteristics. Teacher characteristics that have been shown to bias the referral process include: 1) sex - female teachers are more likely to refer students than male teachers (Kelly, Bullock & Dykes, 1979; Sandler, 1980), 2) ethnicity - teachers are more likely to refer students of ethnicity different from the teacher's (Kelly, Bullock & Dykes, 1977; Tobias, Cole, Zibren, & Bodlakova, 1982), 3) teacher perceptions of the professionals receiving their referrals - teachers with positive perceptions are more likely to refer students for assessment (Christenson, Ysseldyke, & Algozzine, 1982), 4) teacher opinions regarding mainstreaming - teachers with low opinions of mainstreaming are more likely to refer students for assessment (Smart, Wilton, & Keeling, 1980) and 5) marital status - single teachers are more likely to refer students than married teachers (Smart, Wilton, & Keeling, 1980).

Classroom factors. Classroom factors that have been shown to bias the referral process include: 1) number of mainstreamed students in the class - students from classes with relatively high numbers of mainstreamed students are more likely to be referred (Smart, Wilton & Keeling, 1980; Riffle, 1985) and 2) class size - students are more likely to be referred from large classes (Christenson, Ysseldyke, & Algozzine, 1982).

System Characteristics. Finally, regarding system characteristics, Christenson, Ysseldyke, and Algozzine (1982) have noted that advocacy groups, confusion over state and federal guidelines, and parent pressure impact the referral process. Further, several studies have shown that the availability of pre-referral consultation impacts the referral process - teachers provided such consultation are less likely to refer (Ritter, 1978; Gutkin, Singer, & Brown, 1980).

Taken together the data on bias in referral seems to indicate that teacher perceptions of students that may be handicapped and in need of referral are influenced by many biasing factors. However, none of these factors should have a place in the decision making process.

Placement as a Measure of Handicapping Conditions

Data supplied by Ysseldyke and his colleagues and Hofmeister, Ferrara, and Likens (personal communication) raise questions about all studies that have looked at placement as a measure of the degree to which referred students exhibit handicapping conditions. Christenson, Algozzine, and Ysseldyke (1982) found the fact of referral to be the most important factor in determining special education placement. In a national survey they discovered: 1) from three to six percent of the school age population is referred for special education services each year,

2) 92 percent of those referred are tested, and 3) 73 percent of those tested are qualified for special education services. Further, Ysseldyke, Christenson, Pianta, and Algozzine (1983) found that teachers making referrals generally wanted testing and placement in special education. It appears that the fact of referral itself rather than any basis on which it is made is most predictive of special education placement. Further, Algozzine and Ysseldyke (1981) report that, at least in the case of learning disabled students, placement decisions are probably, to a large degree, unreliable. They found that when placement decision makers were presented with assessment data indicating normal performance, more than half the time, they reported they would have qualified the student for special education services. Also, Ysseldyke, Algozzine, Richey, and Graden (1982) found little relationship between assessment data and placement team decisions. Support for the unreliability of placement decisions also comes from research conducted by Hofmeister, Ferrara, and Likens (personal communication). As part of a current study, these researchers systematically examined files of students classified as learning disabled in ten Utah school districts to determine if the assessment data they contained could justify an LD classification based on federal and State of Utah regulations. They found that the classification of approximately half of the students could not be justified, results very similar to those obtained by Algozzine and Ysseldyke (1981). Thus, referral itself, seems to predict placement and the validity of many special education placements is questionable.

Response to Problem

In response to the need to provide educators with tools to improve the referral process, the Technology Division (TD) of the Center for Persons with Disabilities (CPD) at Utah State University (USU) proposed to develop an expert system computer program, Referral Consultant. The system would contain objective criteria for deciding whether or not to refer students for special education assessment and provide a second opinion regarding the appropriateness of referrals. It was anticipated that implementation of the system would reduce bias in the referral process and improve the accuracy and efficiency of the referral/assessment/placement process.

Expert Systems

Recent advances in artificial intelligence (AI) computer technology, specifically expert systems technology, offer the potential for improving the referral and placement procedures of public schools.

Artificial intelligence. Professionals in the field of AI develop computing systems that attempt to replicate human characteristics, such as understanding, learning, reasoning, and problem solving (Barr & Feigenbaum, 1981).

Expert systems. Currently, the most commonly available AI product is the expert system. Typically, expert systems attempt to replicate the decision-making or problem-solving processes used by persons who are knowledgeable and experienced in a particular field (Hofmeister & Ferrara, 1987). Such expert systems engage users in a dialogue which in many ways, parallels expertise in a specific area. The system questions the user to: 1) pinpoint the problem, and 2) provide the information needed by the expert system to suggest a solution (Stefik, Aikins, Balzer, Benoit, Birnbaum, Hayes-Roth, & Sacerdoti, 1983). Solutions are generated through the interaction of two expert system components, an inference engine and a knowledge base. The knowledge base contains the knowledge needed to make a decision in a particular problem domain. The inference engine is a computer program designed to manipulate this knowledge base in a fashion which produces accurate and appropriate problem resolutions.

Referral Consultant Expert System

System Development

The Referral Consultant (RC) expert system was developed during the first year of the project by two task forces. Task force one was composed of special educators from Utah's Granite school district; task force two was composed of special educators from the Blackhills Special Services Cooperative in South Dakota.

Project staff made a presentation to each task force outlining problems research had identified in the referral/assessment/placement process. The presentation pointed out that referral for special education assessment was influenced by a variety of biasing factors, that the fact of referral was the best predictor of placement in special education, and that many special education placements were probably inappropriate. Following the presentation, each task force was asked to address the question, on what basis should the decision to refer students for special education be made? This generated lively debate among both task forces leading to a list of factors that should be considered in making referrals and rules for how those factors should be considered.

Based on the decisions of the task forces at their initial meeting project staff developed a logic document describing how the RC expert system would work and programmed an initial version of the system. The logic-document was sent to all members of the task forces in advance of a second meeting where the initial version of RC was demonstrated. During the demonstration, RC's logic was discussed in detail and task force members pointed out weaknesses and made suggestions for changes.

Based on input obtained at the second meeting of the task forces, project staff rewrote the logic document, reprogrammed the RC expert system, and demonstrated the revised system. This process of review and revision was continued through several cycles until both task forces were satisfied with RC.

Description of Referral Consultant

A complete description of the final logic decided on for Referral Consultant is contained in Appendix A. Following, is a brief description to assist the reader.

1. Referral Consultant first asks a series of questions to determine if a student should obviously be referred for special education assessment. For example, does the student have little or no ability to speak or understand language? If it concludes the student should obviously be referred, it sends a message to do so.

2. For students who are not obvious referrals, RC first compares what the target student can do academically to what the

average student in his/her class can do. This information is used to arrive at a confidence that the student has learning problems or adverse effects on educational performance. The confidence is expressed as a number from 1 to 100 and is similar to a percent. For example, RC might arrive at a confidence factor (cf) of 80, indicating it is 80 percent confident that the student is experiencing learning problems. Unless information provided on the home environment, culture, and/or educational history indicates otherwise, this is also RC's confidence that the student should be referred for special education assessment.

3. After determining a student is experiencing learning problems, RC goes on to ask questions that lead it to conclusions regarding whether those learning problems can be attributed to: 1) behavioral/social-emotional, 2) sensory (vision or hearing), or 3) physical health difficulties. Separate confidence factors indicating how confident RC is that learning problems are due to behavioral or physical difficulties are assigned. For example, RC might conclude that a student's learning problem could be accounted for by behavioral/social-emotional difficulties at a cf of 95. This would indicate RC is 95 percent confident learning problems were due to behavioral/social-emotional difficulties. Observations suggesting the student may have vision or hearing problems are also noted.

4. Next, RC asks questions that lead it to conclusions regarding whether a student's learning problems can be accounted for by non-special education difficulties. The three areas considered are the home environment, cultural differences, and educational history. Separate confidence factors indicate how confident RC is that learning problems are due to difficulties in these areas.

5. Finally, RC asks if two "quality" pre-referral interventions have been tried to help the student. If this has not been done, RC sends a message that its other conclusions are tentative and that appropriate pre-referral interventions should be tried.

RC's final output is a report describing its conclusions with regard to whether the student should be referred for special education assessment. The report can be displayed on the computer monitor or printed for a permanent record. In addition, it may serve as the formal referral form on the student if warranted. An example of a RC report is contained in Appendix B. The report is divided into nine sections:

1. Section one presents demographic information on the student; consultation date, name, school, grade, age, teachers name, and a space to fill in the date the student's parents were notified of the referral.

2. Section two presents RC's conclusions regarding whether the student has learning problems. An overall confidence level is presented on a scale from 0 (completely confident the student does not have learning problems) to 100 (completely confident the

student does have learning problems). Unless information on the student's home environment, culture, or educational history indicates that learning problems result from these factors, the confidence factor presented in this section represents the confidence the user can have that the student should be referred for special education assessment. In addition, the percent of skills the student being considered for referral has mastered compared to same sex peers in his/her class is presented for four academic areas; mathematics, reading, science, and social studies.

3. Section three presents RC's conclusion regarding how confident the user can be that learning problems result from behavioral/social-emotional difficulties. Also, presented are specific behavior problems (e.g. stealing, nightmares, etc.) that led RC to its conclusion.

4. Section four presents RC's conclusion regarding how confident the user can be that learning problems result from physical/health problems. The section also contains a listing of diagnosed health problems, physical symptoms observed in the student, and medications taken for behavioral control or physical/health problems. Finally, observations that may indicate that the student has vision or hearing problems are listed.

5. Section five presents RC's conclusion regarding how confident the user can be that learning problems result from problems in the home environment. Specific family problems that may be impacting the student are listed (e.g. divorce, loss of family income, etc.).

6. Section six presents RC's conclusion regarding how confident the user can be that learning problems result from cultural differences. Specific information provided includes an estimate of the student' English language proficiency compared to same age peers, a statement of the primary language spoken in the student's non-school environment, the number of years of English as a second language instruction provided the student, the student's ethnic background, the percentage of students in the student's school belonging to the same ethnic background, and the number of years the student has resided in the United States.

7. Section seven presents RC's conclusion regarding how confident the user can be that learning problems result from an "unusual" educational history. Specific problems the student has experienced are presented (e.g. frequent change of schools, poor school attendance, etc.).

8. Section eight lists pre-referral interventions that were attempted to ameliorate the student's school difficulties.

9. Section nine provides a complete listing of skills the student being considered for referral has and has not mastered compared to the average same sex student in the class by four academic areas; math, reading, science, and social studies.

Research Methodology

Participating Schools

Eighteen elementary schools cooperated in assessing the impact of RC on the referral/assessment/placement process. Ten schools were from Utah's Granite school district; the other eight were from the B[illegible]lls Special Services Cooperative in South Dakota.

Research Design

The basic research design used in assessing the impact of RC is illustrated in Figure 1. Half the schools in Utah were randomly assigned to an experimental group; the other half were assigned to a control group. In South Dakota, five schools were randomly assigned to an experimental group; three were assigned to a control group. During project year one, baseline data were collected at all schools. In year two, the experimental schools were provided with the RC expert system and asked to use it as an aid in determining whether students should be referred for special education assessment. This design allowed for comparison of differences on a variety of outcome measures from baseline (year 1) to treatment (year 2) and between the experimental and control groups.

	Year 1 (Baseline)		Year 2 (Referral Consultant)	
	State Utah		State South Dakota	
Experimental Group			Experimental Group	
Control			Control	

Figure 1. Research design.

Procedure

To facilitate data collection, a data coordinator was identified in each school in each state. During year one, data coordinators assisted in the collectiion of baseline data aginst which the effects of implementing RC in year two could be measured.

At the beginning of year two a training workshop was held in

each state for the data coordinators from schools implementing RC. Coordinators were provided with necessary computer equipment and an Easy Reference Guide (see Appendix C) to using RC. They were introduced to the program and provided practice in running consultations. Coordinators were also trained in the use of DOS.

Data cooridnators at schools implementing RC were instructed to run the first RC consultation with each referring teacher. Thereafter, referring teachers could elect to run successive consultations for other students independently. As it turned out, in South Dakota an RC consultation was run on all students who were referred for special education assessment. In Utah running an RC consultation on a referred student was made optional by the district special education director. Referring teachers and data coordinators could choose to use RC or not. Many teachers and data coordinators in Utah ran RC consultations based on the number of referrals that had to be processed. Running an RC consultation was reportedly time-consuming. Therefore, when pressure to process referrals was high (fall and spring), many Utah teachers elected to bypass RC for purposes of expediency. Data collected during year two indicated that RC consultations were run on 42% of student referred for special education assessment.

Results

Impact on Referral

Data were collected on the number of students referred for special education assessment in each school. The raw data were converted to the percent of students referred per 100 students in the school via the formula,"number of students in the school referred for special education assessment/number of students in the school". Table 1 presents the mean percent of students referred in the experimental and control groups in Utah and South Dakota during years one and two. Associated standard deviations are also presented.

Table 1

Mean Percent of Students Referred for Special Education Assessment

	Year 1				Year 2			
	Utah		South Dakota		Utah		South Dakota	
	Experimental	Control	Experimental	Control	Experimental	Control	Experimental	Control
M	3.78	4.06	2.81	2.31	2.71	3.34	1.72	1.50
SD	1.21	2.55	2.99	1.52	1.46	1.15	1.00	1.36

The data were analyzed by means of two way analyses of variance (ANOVA). The specific ANOVA was a 2 (states - Utah vs. South Dakota) x 2 (groups - experimental vs. control). Tables 2 and 3 present the results of the ANOVAs for years one and two respectively. The analyses yielded only one significant effect. The main effect for states was significant at greater than the .05 level in year two. Utah referred a significantly greater percentage of students in year two than did South Dakota. Implementation of Referral Consultant in year two had no statistically significant impact on the percent of students referred for special education assessment.

Table 2

ANOVA - Referrals/100 Students - Year 1

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Main Effects	7.543	2	3.771	.732	.498
STATE	7.486	1	7.486	1.453	.248
GROUP	.011	1	.011	.002	.963
2-way Interactions	.660	1	.660	.128	.726
STATE x GROUP	.660	1	.660	.128	.726
Explained	8.203	3	2.734	.531	.669
Residual	72.132	14	5.152		
Total	80.335	17	4.726		

Table 3

ANOVA - Referrals/100 Students - Year 2

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Main Effects	8.900	2	4.450	2.904	.088
STATE	8.053	1	8.053	5.256	.038
GROUP	.312	1	.312	.203	.659
2 way Interactions	.782	1	.782	.511	.487
STATE x GROUP	.782	1	.782	.511	.487
Explained	9.682	3	3.227	2.106	.145
Residual	21.452	14	1.532		
Total	31.134	17	1.831		

There was an overall tendency for schools in all groups to refer lower percentages of students in year two. Interestingly, this tendency was greater in the experimental than in the control groups. Utah's control group referred .72 percent fewer students in year two than in year one, while South Dakota's control group referred .81 percent fewer students. In contrast, Utah's experimental group referred 1.07 percent fewer students in year two than in year one; South Dakota's referred 1.09 percent fewer. Thus, the decrease in the percentage of students referred from year one to two was .35 percent greater in Utah's experimental group than in its control group and .28 percent greater in South Dakota's experimental group than in its control group. However, as noted, this effect was not statistically significant.

Impact on Placement

Data were also collected on the number of students placed in special education in each school. The raw data were converted to the percent of students placed per 100 students in the school via the formula,"number of students in the school placed in special education/number of students in the school". Table 4 presents the mean percent of students placed in the experimental and control groups in Utah and South Dakota during years one and two. Associated standard deviations are also presented.

Table 4

Mean Percent of Students Placed in Special Education

	Year 1				Year 2			
	Utah		South Dakota		Utah		South Dakota	
	Experimental	Control	Experimental	Control	Experimental	Control	Experimental	Control
M	2.19	2.16	1.01	1.14	1.77	1.77	.83	.61
SD	.81	1.56	1.05	.39	1.06	.63	.84	.37

As with referrals, the data were analyzed by means of two way ANOVAs. The specific ANOVA was again a 2 (states - Utah vs. South Dakota) X 2 (groups - experimental vs. control). Tables 5 and 6 present the results of the ANOVAs for years one and two respectively. The analyses yielded only one significant effect. The main effect for states was significant at greater than the .05 level in year two. Utah placed a significantly greater percentage of students in year two than did South Dakota. Implementation of Referral Consultant in year two had no impact on the percent of students placed in special education.

Table 5

ANOVA - Placements/100 Students - Year 1

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Main Effects	5.550	2	2.775	2.283	.139
STATE	5.411	1	5.411	4.452	.053
GROUP	.006	1	.006	.005	.944
2-way Interactions	.031	1	.031	.025	.876
STATE x GROUP	.031	1	.031	.025	.876
Explained	5.580	3	1.860	1.530	.250
Residual	17.016	14	1.215		
Total	22.597	17	1.329		

Table 6

ANOVA - Placement/100 Students - Year 2

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Main Effects	4.672	2	2.336	3.568	.056
STATE	4.667	1	4.667	7.128	.018
GROUP	.040	1	.040	.061	.808
2-way Interactions	.050	1	.050	.076	.787
STATE x GROUP	.050	1	.050	.076	.787
Explained	4.722	3	1.574	2.404	.111
Residual	9.166	14	.655		
Total	13.888	17	.817		

As with referrals, there was an overall tendency for schools in all groups to place lower percentages of students in year two. However, there was no tendency for the decreases to be greater in the experimental than in the control groups. Utah's experimental group placed .42 percent fewer students in year two than in year one, while its control group placed .39 percent fewer. South Dakota's experimental group placed .18 percent fewer students in year 2 than in year one, while its experimental group placed .53 percent fewer.

Impact on Referral Efficacy - Placement/Referral Ratio

The percent of students referred for special education assessment who were placed in special education in each school was taken as one measure of referral efficacy. The rationale here was that an efficient referral system would refer mostly students who were ultimately placed in special education and few who were assessed and not placed. Thus the system would discriminate with a high degree of accuracy those students in need of special education services. Table 7 presents the mean percent of students placed for the experimental and control groups in Utah and South Dakota during years one and two. Associated standard deviation are also presented.

Table 7

Percent of Students Referred Who were Placed in Special Education

	Year 1				Year 2			
	Utah		South Dakota		Utah		South Dakota	
	Experimental	Control	Experimental	Control	Experimental	Control	Experimental	Control
M	58	53	38	57	65	54	38	49
SD	14	16	23	23	10	10	29	18

Again, the data were analyzed by means of 2 (states) x 2 (groups) ANOVAs. Tables 8 and 9 present the results of the ANOVAs for years one and two respectively. No significant effects were yielded. Implementation of RC in year two had no impact on the percent of students placed in special education.

Table 8

ANOVA - Percent of Students Place - Year 1

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Main effects	638.218	2	319.109	.882	.436
STATE	439.839	1	439.938	1.216	.289
GROUP	128.884	1	128.884	.356	.560
2-way Interactions	628.654	1	628.654	1.738	.209
STATE x GROUP	628.654	1	628.654	1.738	.209
Explained	1266.873	3	422.291	1.167	.357
Residual	5064.561	14	361.754		
Total	6331.434	17	372.437		

Table 9

ANOVA - Percent of Students Placed - Year 2

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Main Effects	1299.967	2	649.984	1.853	.193
STATE	1298.851	1	1298.851	3.704	.075
GROUP	11.947	1	11.947	.034	.856
2-way Interactions	518.883	1	518.883	1.480	.244
STATE x GROUP	518.883	1	518.883	1.480	.244
Explained	1818.851	3	606.284	1.729	.207
Residual	4909.621	14	350.687		
Total	6728.472	17	395.792		

Impact on Referral Efficacy - Assessment Time

Assessment time was taken as a second index of referral efficacy. Members of multidiciplinary assessment teams at all participating schools were asked to track the amount of time they spent administering tests, observing students, writing reports, attending meetings, and in other assessment related activities. Table 10 presents the mean hours of assessment time per student for the experimental and control groups in Utah and South Dakota during years one and two. Associated standard deviations are also presented.

Table 10

Mean Hours of Assessment Time for Students Assessed for Special Education

Year 1				Year 2			
Utah		South Dakota		Utah		South Dakota	
Experimental	Control	Experimental	Control	Experimental	Control	Experimental	Control
8.81	13.40	10.23	28.26	5.79	6.23	6.81	7.64
9.69	15.95	9.98	26.75	3.67	4.86	4.35	4.76

The assessment time data were analyzed via a three way analysis of variance. Specifically, the analyses was a 2 (state) x 2(group) x 2(year) ANOVA. Table 11 presents the ANOVA results. As can be

noted, all main and interaction effects were significant.

Table 11

ANOVA - Assessment Time

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Main Effects	13246.218	3	4415.406	32.574	0.0
STATE	2877.896	1	2877.896	21.231	.000
GROUP	3992.497	1	3992.497	29.454	.000
YEAR	7211.668	1	7211.668	53.204	.000
2-way Interactions	5095.863	3	1698.621	12.531	.000
STATE x GROUP	2042.715	1	2042.715	15.070	.000
STATE x YEAR	1134.985	1	1134.985	8.373	.004
GROUP x YEAR	2209.857	1	2209.857	16.303	.000
3-way Interactions	1287.226	1	1287.226	9.496	.002
STATE x GROUP x YEAR	1287.226	1	1287.226	9.496	.002
Explained	19629.306	7	2804.187	20.688	0.0
Residual	90681.978	669	135.549		
Total	110311.284	676	163.182		

The main effect for state was significant at greater than the student on assessment (x = 13.22 hrs./student) than did Utah (x = 8.97 hrs./student). The group main effect was also significant at greater than the .001 level of confidence. Overall, more time was devoted to assessing students in the control group (x = 12.10 hrs./student) than was devoted to assessing students in the experimental group (x = 7.97 hrs./student). Finally, the year main effect was also significant at greater than the .001 level of confidence. Overall, more time was spent assessing students in year one (x = 12.81 hrs./student) than in year two (x = 6.31 hrs./student).

The assessment time state x group interaction was significant at greater than the .001 level of confidence. This interaction is shown in Figure 2. In Utah, on average 7.55 hours were spent assessing students in the experimental group. On average, 10.14 hours were spent assessing students in the control group, 2.59 hours more than for students in the experimental group. In South Dakota, more time was spent assessing students in the control than in the experimental group and the difference was relatively more than in Utah. On average, 8.87 hours were spent assessing students in the experimental group; 19.89 hours were spent assessing control group students, 11.02 hours more than for the experimental group.

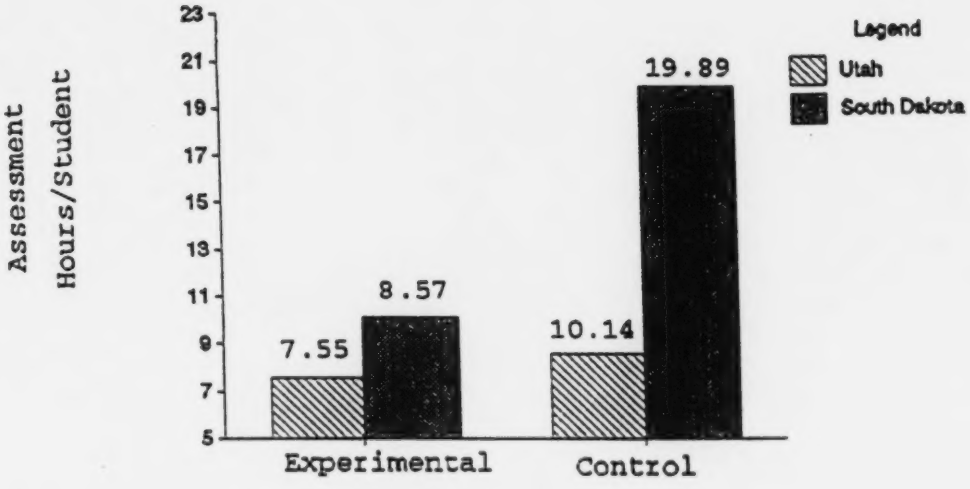

Figure 2. Assessment time interaction - state x group.

The state x year assessment time interaction was also significant at the .004 level of confidence. This interaction is illustrated in Figure 3. In Utah, on average, 11.25 hours were spent assessing students in year one. This decreased by 5.21 hours to 6.04 hours per student in year two. South Dakota's assessment time per student also decreased from year one to year two and was relatively greater than the decrease for Utah. In year one and average of 17.27 hours per student was spent in assessment activities. This decreased by 10.13 hours to 7.14 hours per student in year two.

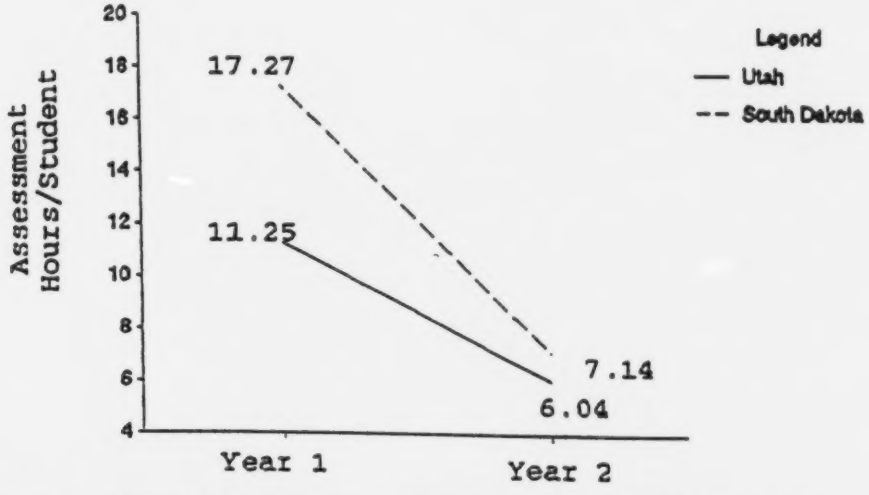

Figure 3. Assessment time interaction - state x year.

The assessment time group x year interaction was significant at greater than the .001 level of confidence. This interaction is shown in Figure 4. In year one an average of 9.27 hours per student was spent in assessment. This decreased by 3.17 hours per student to 6.10 hours in year two. The mean hours of assessment per student also decreased from year one to year two for the control group and by relatively more than for the experimental group. In year one, an average of 16.59 hours per student were spent in assessment. This decreased by 11.50 hours to 5.09 hours in year two.

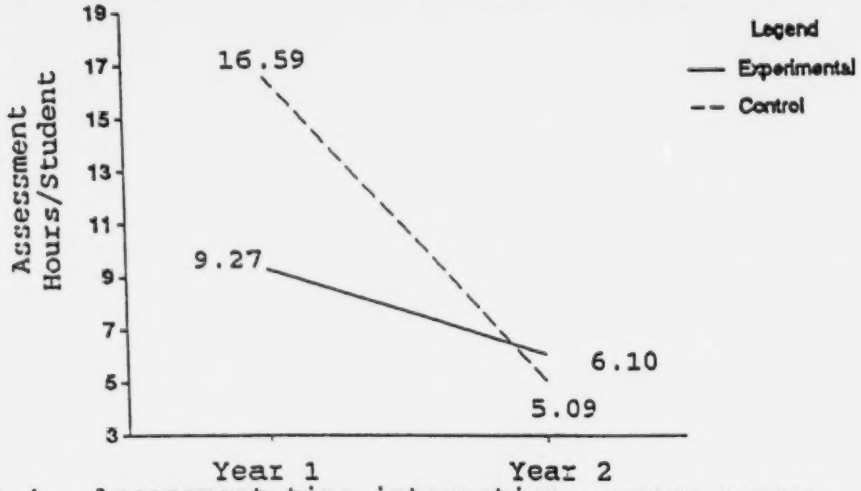

Figure 4. Assessment time interaction - group x year.

The three way interaction, state x group x year, for assessment time was also significant at the .002 level of confidence. This interaction is shown in Figure 5. As the figure shows, the mean hours of assessment time decreased for both groups in both states. Decreases were relatively greater for the control than experimental groups, and relatively greater in South Dakota than in Utah.

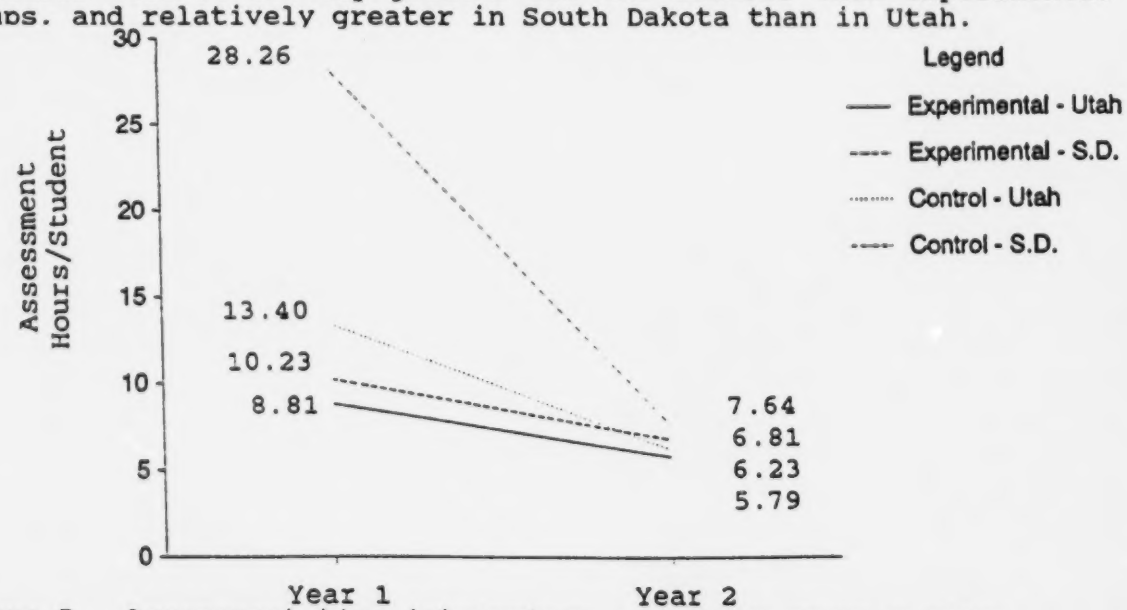

Figure 5. Assessment time interaction - state x group x year.

Impact on Bias

For each referred student, data were collected on a variety of teacher, student, and class characteristics previous research had show to bias the referral process. The same data were also collected on randomly selected students matched with the referred students for sex and grade level who had not been referred for special education in Appendix D. The characteristics of interest were as follows:

1. Teacher Gender - male or female
2. Teacher Ethnicity - white or nonwhite
3. Teacher Marital Status - married or unmarried
4. Teacher Has Children - has children or has no children
5. Competence Professionals Receiving Referral - rated on a scale from 1 = completely incompetent to 5 = extremely competent.
6. Appropriateness of Mainstreaming Mild/Moderate Disabled Students - rated by the teacher on a scale from 1 = disagree to 5 = agree.
7. Appropriateness of Mainstreaming Severe Disabled Students - rated by the teacher on a scale from 1 = disagree to 5 = agree.
8. Class Potential - teacher rated each student in his/her class on a scale from 1 = low potential to 5 = high potential.
9. Variability Potential - the standard deviation of the ratings described in item eight.
10. Mainstreamed Students - the percentage of students in the class who were mainstreamed students.
11. Class Size - the number of students in the class.

Stepwise discriminant analyses were run on the above variables to determine which variables best predicted referral for special education assessment. Separate analyses were run for the experimental and control groups in Utah and South Dakota in both year one and year two. Thus, eight discriminate analyses were run in all.

Table 12 presents the standardized coefficients for each of the discriminant analyses. As the table shows, none of the variables were always included among those that best predicted referral. Teachers' perceptions of the appropriateness of mainstreaming severe/moderate students and their perceptions of the appropriateness of mainstreaming severe students were the variables most often found to be predictive of referral. Each was found to be

an important discriminator in five of the eight analyses, although not necessarily in the same analyses. Interestingly, the direction of prediction was not consistent across the analyses in which these variables were shown to be important predictors. In four of the analyses in which teacher perceptions of the appropriateness of mainstreaming mild/moderate students appeared as important predictors high rating of appropriateness were associated with referral. However, in one analysis low ratings were associated with referral. Similarly, in three of the five analyses in which teacher perceptions of the appropriateness of mainstreaming severe students appeared as important predictors high ratings of appropriateness were associated with referral. However, in the two other analyses low ratings were associated with referral. This was also the case for teachers having children and teacher marital status. In one analysis the teacher having children was associated with referral; in two others not having children was associated with referral. Further, in one analysis the teacher being single was predictive of referral; in another the teacher being married was predictive of referral.

Table 12

Discriminant Analysis Standardized Coefficients

	Year 1				Year 2			
	Utah		South Dakota		Utah		South Dakota	
Variable	Experimental	Control	Experimental	Control	Experimental	Control	Experimental	Control
Mainstreamed Students				.30		.75		
Teacher Ethnicity						-.57		
Appropriateness Mainstreaming Mild/Moderate		.72		-.42	.52	.39	.96	
Appropriateness Mainstreaming Severe	.35	-.78	.38				-.63	.90
Teacher Gender					.81			.77
Teacher has Children	.77			-.42	-.60			
Class Potential	.61			.82	.48			
Number of Students in Class			.66		.46			
Variability Class Potential		.45	.69				.51	.42
Teacher Marital Status			.30	-.43				

Variability in teachers' perceptions of class potential was the variable that most consistently predicted referral in the same direction. It appeared as an important predictor in four of the eight analyses, and high ratings of variability were consistently associated with referral.

Implementation of RC in year two did not appear to impact referral bias in any systematic way. Variables identified as important in predicting referral in the experimental groups in year one sometimes were and sometimes were not those identified as important predictors in year two. Further, the same variables were not necessarily identified as important predictors in the two experimental groups in either year.

Accuracy of Classification Decisions

Originally, it was planned that comparisons would be made among the classification decisions of 1) the multidisciplinary teams placing students in Utah schools, 2) Utah State Office of Education (USOE) classification experts, and 3)expert systems computer programs designed to give a second opinion regarding classification of students as learning disabled (LD), seriously emotionally disturbed (SED), mentally retarded (MR), orthopedically impaired (OI) and speech impaired (SI). Unfortunately, two factors combined to make the planned analysis impossible. First, too few students were identified as MR, OI, and SI to do a meaningful analysis. Second, as project staff reviewed the files of students classified by the multidisciplinary teams as LD and SED, and ran consultations using the appropriate expert systems it became apparent that the large majority of files contained too little classification data to run a meaningful consultation.

In an attempt to estimate the relationship between multidisciplinary team, USOE expert, and expert system classification decisions a small sample of files on students classified as LD and SED were submitted to USOE experts for review. Three experts reviewed each file and gave their opinions as to whether the students should be classified as disabled and qualified for special education services. Data were also available from consultations with the LD expert system for most students classified as LD. However, it needs to be stressed that the results of these consultations are suspect because project staff were often forced to make assumptions and guesses when data were not available in the files reviewed. Unfortunately, none of the files on the SED students contained enough data to run a meaningful expert system consultation.

Table 13 presents a summary of the LD and SED classification decisions made by the multidisciplinary teams, USOE experts, and the LD expert system. The multidisciplinary teams classified all of the students assessed for learning disabilities as LD. USOE experts agreed with these classification decisions in only two cases (20 %) and disagreed in eight (80%). The LD expert system conclusions agreed with the multidisciplinary team and the USOE experts on one case where the latter two agreed the student should be classified as LD. In two cases the LD expert system conclusions were borderline indicating the classification decision could go either way. Of the remaining six cases where a decision was available from all three entities the LD expert system conclusions agreed with the

multidisciplinary teams in four cases (67%) and with the USOE experts in two cases (33%). The multidisciplinary teams also classified all of the students assessed for serious emotional disturbance as SED. USOE experts agreed with only one of these decisions (10%). Ninety percent of the time the USOE experts disagree with the multidisciplinary teams' decisions to classify students as SED.

Table 13

Comparisons of Multidisciplinary Team, USOE Expert, and LD expert System Classification Decisions

LD Students	Team Decision	USOE Decision	Expert System Decision
1	yes	no	no
2	yes	no*	no
3	yes	no	Borderline
4	yes	no	Borderline
5	yes	yes	--
6	yes	yes*	yes
7	yes	no	yes
8	yes	no*	yes
9	yes	no*	yes
10	yes	no	yes
SED Students			
1	yes	no*	--
2	yes	no	--
3	yes	no	--
4	yes	no*	--
5	yes	no*	--
6	yes	yes*	--
7	yes	no	--
8	yes	no	--
9	yes	no*	--
10	yes	no*	--

* USOE experts were divided on these decisions

Accuracy of RC

The final planned analysis was to examine the relationship between RC referral decisions and the classification decisions of expert systems. Unfortunately, failure to obtain sufficient,

meaningful, expert system consultation decisions made this analysis impossible.

User Suggestions

Project staff worked closely with teachers and special education supervisors at the schools where RC was implemented during year two. As a result of this experience staff had frequent opportunities to obtain feedback on RC and suggestions for improving its usefulness to teachers. A summary of the suggestions most frequently made follows:

1. RC requires that teachers input information on what skills from the Utah Core Curriculum average students in the class have and have not mastered. Further, the same information is required on the student being considered for special education referral. A frequent comment was that something should be done to shorten this data gathering process and make things easier for the referring teacher.

2. RC collects data such as that described in item 1 for any of four academic areas (math, reading, science, and social studies) the referring teacher indicates are a concern. The program assumes that the student being referred has mastered at least as many skills as the average student in the class for all areas that are not identified as a concern and this information is included in the consultation final report. Some teachers felt that this is not a safe assumption and that to report based on it that a student has mastered 100 percent of the skills the average student in the class has mastered may be misleading.

3. Most teachers suggested that the Utah Core Curriculum be revised. They expressed the opinion that some areas don't apply or should be weighted differently in the referral decision process.

4. RC has an "error loop" that allows a teacher running a consultation to go back to any section of the program in which an error has been made and correct it. This feature is not available for correcting demographic information on the student asked for at the beginning of a consultation. Some teachers suggested that this feature be incorporated.

5. Some teachers suggested that RC's final report be printed on "NCR" paper so that copies were readily available.

6. Some teachers suggested that SAT scores and other achievement information be considered in the RC referral decision process.

7. RC presents a menu of behavior problems that research has shown indicates a student is likely to have difficulty in school and asks if the student exhibits any of those behaviors. Some teachers suggested that this section be expanded to allow the teacher to input information on additional problem behaviors not

on the list.

Discussion

Associated with the implementation of RC in year two of the present study was a tendency for the percent of students referred for special education to decrease in both the experimental and control groups. This tendency was more marked in the experimental than in the control groups, but the effect was not found to be statistically significant. Similarly, a tendency for lower percentages of students to be placed in special education in year two was associated with implementation of RC for both the experimental and control groups. This effect was not found to be statistically significant and no differences between the experimental and control groups were observed. Finally, implementation of RC had no statiscally significant effect on the ratio of students placed in special education to students referred for assessment.

In summary, implementation of RC had no statistically significant impact on the percentage of students referred for special education assessment, the percentage of students placed in special education, or the ratio of students placed to students assessed. Trends in the data suggest RC may have some slight effect in decreasing the percent of students referred for assessment. At best, implementation of RC, and consideration of the factors associated with its implementation by teachers and assessment personnel in making referrals, may be a necessary but not sufficient condition for improving the referral/assessment/placement process.

Coincident with the implementation of RC, there was a highly significant decrease from year one to year two in the mean hours of assessment time devoted to students in both the experimental and control groups. Further, this effect was significantly more pronounced in the control than in the experimental groups. During year one, significantly more assessment time was devoted to students in the control groups (UT - $\bar{x}$ = 13.40, SD - $\bar{x}$ = 28.26) than in the experimental groups (UT - $\bar{x}$ = 8.81, SD - $\bar{x}$ = 10.23). In year two the mean amount of assessment decreased for all groups to be roughly equal (UTexp. - $\bar{x}$ = 5.79, UTcon. - $\bar{x}$ = 6.23, SDexp. - $\bar{x}$ = 7.64, SDcon. - $\bar{x}$ = 6.81). The reasons for this change are not clear.

Implementation of RC had no discernible impact on the effects of variables biasing the referral process. However, perhaps the most interesting finding in the entire study was that variables predicting referral for special education assessment were not consistent. In the present study, eight discriminate analyses identified no variable that consistently predicted referral for special education assessment. Further, some variables were found to predict being referred in one analysis and not being referred in another. These findings suggest that there is no simple relationship between the variables studied and whether or not a student will be referred for special education assessment. Rather, it appears that complicated interactions are at work and that the

results of previous studies have painted a less than complete picture of how these variables function in predicting referral. Much additional research might be directed toward unraveling this puzzle.

The zero to minimal impact implementation of RC had in improving the referral/assessment/placement process was, of course, disappointing to the project staff. Never-the-less, staff are committed to developing expert systems that will assist special educators in improving that process. In the future, RC will be revised to incorporate those changes users in the present study suggested. Further, project staff will attempt to find new ways to implement the system and continue to assess its impact on the referral/assessment/placement process.

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Appendix A

Referral Consultant Logic

Referral Consultant Logic

Technology Division
Developmental Center for Handicapped Persons
Utah State University
Logan, Utah

September, 1989

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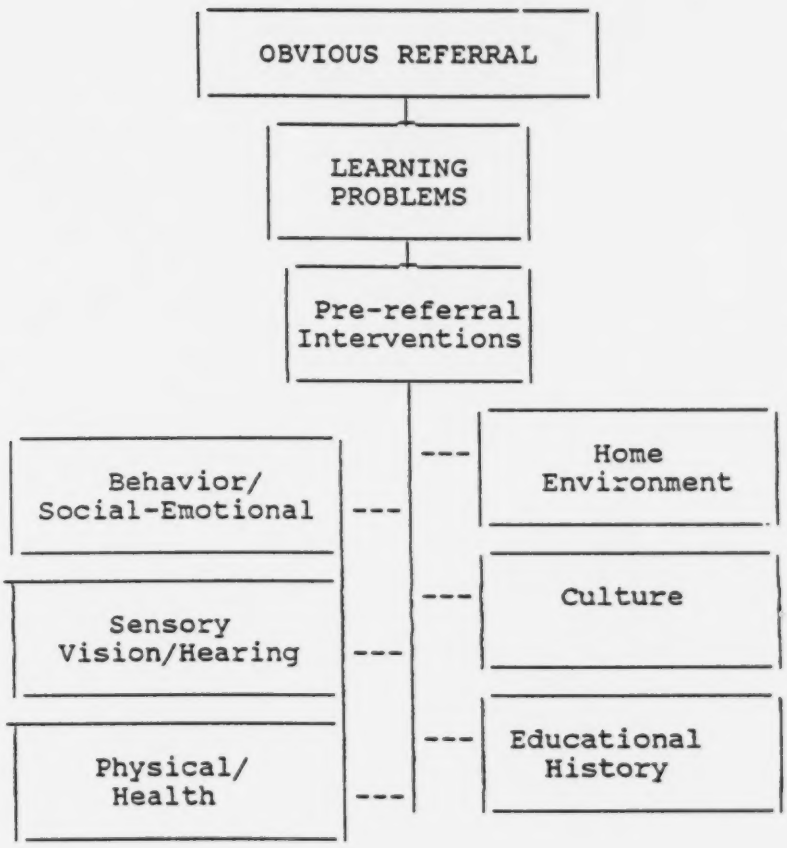
Referral Consultant
Overview



Overview

1. Referral Consultant (RC) first asks a series of questions to determine if a student should obviously be referred for special education assessment. If it concludes the student should obviously be referred it sends a message to do so.

2. For students who are not obvious referrals RC first compares what the target student can do academically to what the average student in his/her class can do. This information is used to arrive at a confidence that the student has learning problems or adverse effects on educational performance. The confidence is expressed as a number from 1 to 100 and is similar to a percent. For example, RC might arrive at a confidence factor (cf) of 80, indicating it is

80 percent confident that the student is experiencing learning problems. Unless information provided on the home environment, culture, and/or educational history indicates otherwise this is also RC's confidence that the student should be referred for special education assessment.

3. After determining a student is experiencing learning problems, RC goes on to ask questions that lead it to conclusions regarding whether those learning problems can be attributed to 1) behavioral/social-emotional, 2) sensory (vision or hearing), or 3) physical/health difficulties. Separate confidence factors indicating how confident RC is that learning problems are due to behavioral or physical difficulties are assigned. For example, RC might conclude that a student's learning problems could be accounted for by behavioral/social-emotional difficulties at a confidence factor of 95. This would indicate RC is 95 percent confident learning problems were due to behavioral/social-emotional difficulties. Observations suggesting the student may have vision of hearing problems are also noted.

4. Next, RC asks questions that lead it to conclusions regarding whether a student's learning problems can be accounted for by non-special education difficulties. The three areas considered are the home environment, cultural differences, and educational history. Separate confidence factors indicate how confident RC is that learning problems are due to difficulties in these areas.

5. Finally, RC asks if two "quality" pre-referral interventions have been tried to help the student. If this has not been done, RC sends a message that its other conclusions are tentative and that appropriate pre-referral interventions should be tried.

Referral Consultant Logic

Obvious Referral

System Questions and Rules

RC asks the following question to get at whether the student should obviously be referred for special education assessment:

> Does the student exhibit any of the following conditions which would obviously be grounds for referral for special education assessment? Enter the number of each condition that applies separating them with commas (e.g. 2,3,5). The student:
>
> 1. exhibits NONE of the below.
> 2. has LITTLE or NO ability to speak or understand LANGUAGE.
> 3. exhibits extreme PSYCHOTIC or obviously BIZARRE BEHAVIOR that interferes with educational performance.
> 4. is obviously BLIND or DEAF.
> 5. is so shy and withdrawn that he/she never or RARELY INTERACTS with others, and educational performance is impaired.
> 6. is OBVIOUSLY FAR BELOW his/her peers in ACADEMIC ACHIEVEMENT.
> 7. has a SEVERE PHYSICAL/HEALTH IMPAIRMENT that interferes with educational performance.
> 8. exhibits an obvious reason for referral which is not listed.

If the user responds with #1, RC moves on continuing the consultation.

If the user responds with #8, RC asks the user to input the other reasons:

> Please enter the obvious reason for referral that applies to this student which wasn't on the list. The student:

If the user responds with #2-8, RC sends a message that the student should be referred that lists all the reasons selected and ends the consultation.

Referral Consultant Logic

Pre-referral Intervention

Referral Consultant asks what pre-referral interventions have been tried with the student. If attempts to remediate the student's problem(s) through non-special education interventions were not tried, there may be no need to go all the way through a consultation. If two quality interventions have not been tried, the user is given the option to quit or continue. The question asked is this:

> TWO or more QUALITY INTERVENTIONS must be attempted by regular educators prior to referring a student for special education assessment.
>
> Examples of acceptable quality interventions include: behavior management programs, a change of classroom teacher, adjusting academic variables (e.g. curriculum, materials, schedule), Chapter I or other remedial programming, peer tutoring, etc.
>
> Examples of non-acceptable interventions include parent/child conferences that do not result in specific actions to be taken.

NOTE: For an explanation of what constitutes QUALITY interventions type "why".

> Have two or more quality interventions been attempted by regular educators?
>
> 1. yes
> 2. no

If the user types "why":

> Quality interventions are those which meet the following criteria:
>
> - The child and his/her parents were informed of the problem.
> - Plans were developed to remediate the problem.
> - A team of educators feels that the plans were appropriate and well implemented.
> - Documentation through data collection on the interventions' effectiveness was obtained for at least one week.

If the user answers "yes", the program asks the user to type in the interventions tried and the following message is incorporated into the final report:

The following pre-referral interventions have been tried with this student:

(List input by user)

If the user answers "no", he/she is given the message below and asked if he/she would like to continue the consultation. If the user chooses to continue a similar message is incorporated into the final report.

Best practices in special education dictate that before a student is referred for special education assessment at least two quality interventions be tried to correct the student's learning problems. Since this has not been done conclusions drawn by Referral Consultant at the end of this consultation will be tentative. It is recommended that appropriate interventions be attempted and that a new Referral Consultant consultation be run based on the student's status following those interventions.

Do you wish to continue the consultation?

1. yes
2. no

Referral Consultant

Learning Problems
(Adverse Effects on Educational Performance)

System Questions and Rules

RC asks the following question to determine where the student is having learning problems.

In which of the following areas is the student experiencing learning problems? Enter the number of each area separating them with commas (e.g. 2,3).

1. None of the below.
2. Reading/Language Arts
3. Mathematics
4. Science
5. Social Studies

If #1 is chosen, the following statement appears:

The student is not experiencing learning problems in any major academic area and, therefore, should not be referred for special education assessment. However, continuing the consultation may help you determine if the student should be referred for non-special education services. Do you wish to continue?

1. yes
2. no

If any combination of #2-5 is chosen:

For each area indicated, RC next asks what skills the average student of the same sex in the class has. The skills are taken from the Utah Core Curriculum.

The skills are presented on the computer screen in menus. For example:

From the following Utah Core Curriculum objectives, which of the following skills CAN the AVERAGE male student in Dick's class do?

1. None of the below
2. Identify, read, and write any given numeral to 10,000.
3. Recognize that multiple digit numerals are grouped into periods of three digits.
4. Identify the place value of a digit in numerals to 10,000.

5. Demonstrate place value to 9,999 using expanded notation, e.g., 9,999 =9,000 + 900 + 90 + 9 = x9 thousands + 9 hundreds + 9 tens + 9 ones.
6. Use halves, thirds, or fourths to identify the fractional parts of a set of region.
7. Compare any two numbers between 1 and 9,999 using symbols greater than (>), less than (<), or equal (=).

There are between 2 and 5 menus for each subject per grade. The first group of menus presents skills from the target student's grade level. If the average student can do less than half the skills at grade level, RC drops back a grade. A cycle going down continues until more than half the objectives are chosen or grade 0 is reached. If the average student can do more than half the objectives from the beginning grade level, RC moves up a grade level. This cycle continues up until the average student can do less than half of the objectives, or until grade 12 is reached. Thus, skills over at least two grade levels are sampled.

Example: Dick is in 2nd grade and has trouble in mathematics. Mr. Brown, the concerned teacher, is presented the menus for 2nd grade math. Mr. Brown inputs the skills which the average student in his class can do. The average student in Mr. Brown's class can do more than half of the skills from the 2nd grade math menus, therefore, the program moves to the third grade menus. Mr. Brown inputs what skills the average student in his class can do from these menus. It is less than half and therefore RC would move down a grade, but since the 2nd grade menus have already been shown, the cycle quits.

After determining the skills the average student can do, RC combines them into menus and asks which of the skills the target student cannot do. For example:

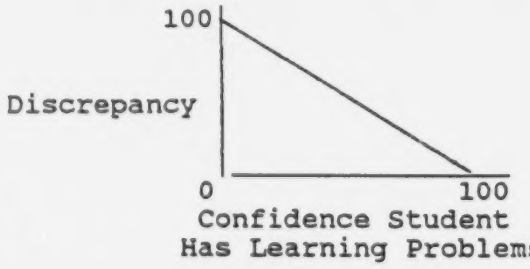
You have identified the following list of skills which the AVERAGE STUDENT in Dick's class CAN DO. Which can Dick NOT do?

1. Dick can do All of the below.
2. Identify, read, and write any given numeral to 1,000.
3. Identify the place value of a digit by its position in the ones, tens, or hundreds place.
4. Demonstrate place value to 999 using expanded notation, e.g. 999 = 900 + 90 + 9; 999 = 9 hundreds + 9 tens + 9 ones.
5. Identify and read the symbols 1/2, 1/3, 1/4 as names for some fractions.
6. Count and order numbers by 1's to 1,000 & 2's to 100.

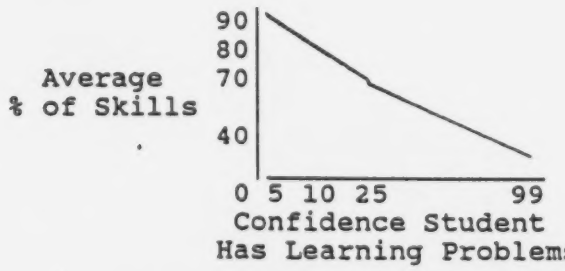
Using the information provided RC calculates what percent of skills the target student has in each area, i.e., math, reading, science, and social studies. For example, if the average student has 50 math skills and the target student has 10, the target student has 20 percent of the math skills the average student

has. If the user indicates the student was not having trouble in an area, RC assumes the target student has 100 percent of the skills the average student has.

RC applies two rules to the four percents of skills to arrive at a conclusion regarding whether the student is having substantial learning problems. First, it considers the discrepancy between the lowest of the math or reading percents and the highest other percent. For example, if a student's percents were math = 20, reading = 80, science, = 85, social studies = 80, RC considers the discrepancy between science (85 is the high score) and math (20 is the lowest of reading and math). The discrepancy is calculated as science (85) - math (20) = 65. RC is 65 percent certain the student has learning problems. The rationale for this decision is that a student who is potentially LD will show a large discrepancy between an area where he/she could qualify as LD (math or reading) and other areas of academic achievement. Finally, the following regression equation describes the relationship between the discrepancy and the confidence RC has that a student has learning problems.



The other rule RC applies to the four percents is to average them. For example, if a student's percents were math = 20, reading = 25, science = 15, and social studies = 20, the average would be 20. This average figure is entered into the following regression equation to arrive at a confidence the student has learning problems.



A student with an average score of 40 has 40 percent of the skills the average student in the class has. Since the percent of skills is low the regression equation leads us to high confidence 99% that the student has learning problems. The rational is that an MR student will have low percents across all four areas and therefore a low average.

RC takes the highest of the two confidences generated by applying the rules as the best estimate that the student has learning problems.

If RC's confidence that a student has learning problems is less than 20 percent the following message is displayed to the screen.

> There is less than a 20% chance that Dick is experiencing learning problems that would require special education services (Certainty Factor = CF,'/100).
> Referral Consultant will next present a series of questions to examine whether Dick could benefit from non-special education services such as counseling, a multi-cultural program, etc. Do you wish to continue the consultation?
>
> 1. Yes, I wish to continue
> 2. No, end the consultation

Referral Consultant

Behavior

Granite school district has come with an innovative idea for deciding if learning problems are the result of behavior problems. It is based on the work of Hill Walker and his colleagues at the University of Oregon who have been developing a system for screening behaviorally disordered students. Walker et.al. have collected data indicating that certain critical events (behaviors) discriminate students who are at high risk for behavior disorders. Those as listed on their screening instrument events are:

SSBD Stage Two For Externalizing Student
Critical Events Index

Date _____ Teacher _____ School _____

Student _____ Student Sex _____ Student Grade _____

Check one: Rank 1 ___ 2 ___ or 3 ___

Instructions: Check each behavior that you are aware the student has exhibited during this school year. Please specify any serious behavior not appearing on this list.

_____ 1. Steals.

_____ 2. Sets fires.

_____ 3. Vomits after eating.

_____ 4. Has tantrums.

_____ 5. Physically assaults an adult.

_____ 6. Exhibits painful shyness.

_____ 7. Exhibits large weight loss or gain over past three months. (Significant weight fluctuation would be in excess of 20% change in body weight.)

_____ 8. Exhibits sad affect, depression and feelings of worthlessness to such an extent as to interfere with normal peer and classroom activities.

_____ 9. Is physically aggressive with other students or adults (hits, bites, chokes, or throws things.

_____ 10. Damages others' property (academic materials, damages personal possessions).

_____ 11. Demonstrates obsessive-compulsive behaviors. (Child can't get his/her mind off certain thoughts or obsessions).

_____ 12. Reports having nightmares or significant sleep disturbances.

_____ 13. Engages in inappropriate sexual behaviors (masturbation, exposes self).

_____ 14. Is self-abusive (biting, cutting or bruising self, head banging).

_____ 15. Attempts to <u>seriously</u> physically injure another using weapons or objects.

_____ 16. Suddenly cries or displays highly inappropriate affect in normal situations.

_____ 17. Complains of <u>severe</u> headaches or other somatic complaints such as stomach aches, nausea, dizziness, or vomiting.

_____ 18. Talks of killing him\herself. Reports having suicidal thoughts or being preoccupied with death.

_____ 19. Exhibits thought disorders or gets lost in own thoughts.

_____ 20. Ignores teacher warnings or reprimands.

_____ 21. Makes lewd or obscene gestures.

_____ 22. Shows evidence of physical abuse.

_____ 23. Shows evidence of drug use.

_____ 24. Reports being sexually abused.

_____ 25. Uses obscene language or swears.

_____ 26. Exhibits cruelty to animals.

_____ 27. Is teased, neglected and/or avoided by peers.

_____ 28. Has severely restricted activity levels.

_____ 29. Is enuretic (bed wetting).

_____ 30. Is encopretic (inadequate bowel control).

_____ 31. Sexually molests other children.

_____ 32. Has auditory or visual hallucinations.

_____ 33. Has severe lack of interest in activities which were previously of interest.

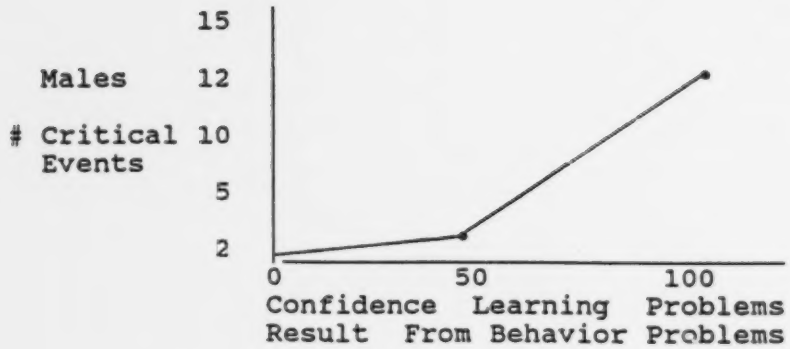
Walker et.al. have collected data indicating that students identified by teachers as fitting profiles of externalizing and internalizing behavior disorders score higher on the Critical Events Scale than normal control students. Briefly, externalizers are students who act out, and internalizers are students who are shy and withdrawn. The following table presents means and standard deviations for various groups on the Critical Events Scale.

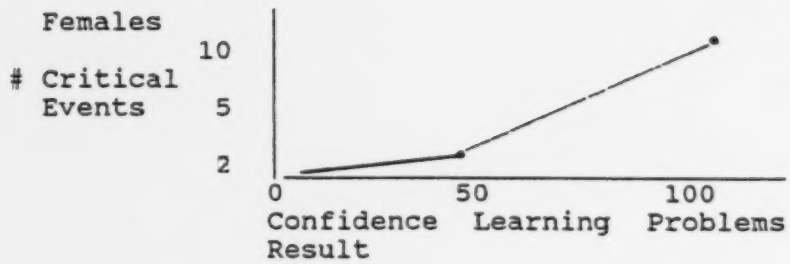
TABLE 1

Means and Standard Deviations by Group and Sex
for Items Checked on the SSBD Critical Events Index

	$\bar{X}$	SD	N
Externalizers			
All	5.27	3.21	33
Male	5.69	3.10	29
Female	2.25	1.69	4
Internalizers			
All	3.73	2.83	15
Male	2.71	1.58	7
Female	4.63	2.49	8
Controls			
All	.11	.43	235
Male	.12	.45	119
Female	.11	.41	116

RC presents the critical events and ask which of the behaviors the student has exhibited in the current school year. The number of behaviors engaged in is entered into one of the following equations to assign a probability that learning problems result from behavior problems.


Males
Critical Events
15
12
10
5
2
0
50
100
Confidence Learning Problems Result From Behavior Problems


Females
Critical Events
10
5
2
0
50
100
Confidence Learning Problems Result

Referral Consultant

Sensory (Vision/Hearing)

Vision

In dealing with vision RC asks the following question:

Does the student exhibit any of the following symptoms of possible visual impairment? Separate multiple answers with commas (e.g. 2,5,6).

1. NONE of the below.
2. Rubs eyes
3. Headaches
4. Slow reader
5. Frequent sties
6. Bloodshot eyes
7. Oversensitive to light
8. Tilts head to read
9. Eyes in constant motion
10. Double vision
11. Frequent pain in eyes
12. Unable to distinguish color
13. Shuts or covers one eye when reading
14. Confuses similar letters (e.g. m and n)
15. Frowns or squints when trying to see objects
16. Fails to see objects in peripheral vision
17. Holds written work close or far away to see it
18. Difficulty reading the chalkboard (squints)
19. Difficulty reading written work (holds away)
20. Crossed eyes
21. Swollen eyelids
22. Eyes not functioning together
23. Red rimmed or crusted eyelids
24. Blinks constantly
25. Pupils of different sizes
26. Frequently trips or stumbles
27. Walks with extreme caution
28. Burning or itching eyelids
29. Complains of blurred vision
30. Other

If other is chosen RC reads the following message:
Please enter the other symptoms of possible visual impairment you have observed. Separate multiple answers with commas.

If none is chosen RC skips to the next section of the consultation.

If any combination of 2-30 is chosen RC notice all symptoms and presents them in the final report.

Hearing

In dealing with hearing RC begins with the following question.

Does Dick exhibit any of the following symptoms of possible HEARING impairment?
(Enter the number of all that apply, separating them with commas, e.g. 2,5,6.)

1. NONE of the below.
2. seems not to hear or misinterprets instructions, and may be frustrated
3. rubs or pulls at ears
4. Asks others to repeat a lot (what, huh)
5. responds to questions with out-of-context remarks
6. continual earaches
7. slurred speech
8. incorrect pronunciation/misunderstood
9. difficulty comprehending material read orally
10. speaks with a loud voice
11. speaks with a flat or monotone voice
12. daydreams and doesn't seem to pay attention
13. difficulty understanding when speaker is behind or across the room from Dick.
14. Other

If other is chosen RC sends the following message:
Please enter the other symptoms of possible hearing impairment you have observed. Separate multiple answers.

If none is chosen RC skips to the next section of the consultation.

If any combination of 2-14 is chosen RC notes all symptoms and presents them in the final report.

Referral Consultant

Physical/Health

System Questions and Rules

RC next attempts to determine if physical/health problems can account for the student's learning problems. It first asks if the student has any of the following diagnosed conditions:

Has the student been diagnosed by a physician to have any of the following problems? Separate multiple answers with commas (e.g., 2,5,10).

1 = NONE of the below
2 = amputation
3 = arthogryposis (persistent flexture or contracture of a joint)
4 = asthma
5 = brain injury
6 = cerebral palsy
7 = diabetes
8 = epilepsy
9 = heart condition
10 = hemophilia
11 = lead poisoning
12 = leukemia
13 = mental retardation
14 = motor dysfunction
15 = muscular dystrophy
16 = nephritis (kidney inflammation)
17 = respiratory disorder
18 = rheumatic fever
19 = sickle cell anemia
20 = spina bifida
21 = spinal cord injury
22 = tuberculosis
23 = other

If other is chosen RC asks:
What other diagnosed problems does the student have? (Separate multiple answers with commas.)

RC then asks if the student exhibits any of the following symptoms:

Does the student FREQUENTLY exhibit any of the following symptoms? Separate multiple answers with commas.

1. None of the below.
2. Tiredness
3. Listlessness
4. Complains of pain
5. Absent for illness
6. Petite mal seizures, brief lapses of consciousness
7. Runny nose
9. Chronic symptoms (headaches, stomachaches)
10. Vomiting
11. Diahrrea
12. Complains of feeling ill

13. Thirsty
14. Urination
15. Other

If other is chosen RC asks:
What other frequent symptoms does the student exhibit? (Separate multiple answers with commas.)

Finally RC asks the user to estimate on a scale of 0 - 100 how much the diagnosed problems or symptoms account for learning problems. This is taken as the confidence that physical/health problems account for learning problems.

How much do the student's physical/health problems and symptoms (LIST OF PROBLEMS & SYMPTOMS) contribute to adverse effects on educational performance?

```
|----|----|----|----|----|----|----|----|----|----|
0                         50                       100
Not at all              About Half                 All
```

RC also collects information on medications taken by the student.

Is this student taking ANY medications regularly?
1. yes
2. no

If yes is chosen RC asks:
Why does the student take medications regularly? Input the number(s) of all that apply separating them with commas.
1. control of behavioral problems
2. control of physical/health problems
3. unknown reasons

If behavioral (#1) - What medications does the student take regularly to control behavioral problems? Separate multiple answers with commas.

If physical (#2) - What medications does the student take regularly to control physical/health problems? Separate multiple answers with commas.

If unknown (#3) - What medications does the student take regularly for reasons unknown to you? Separate multiple answers with commas.

The following message is incorporated in the final report.

Based on the information provided you can be _____ percent certain that the student's learning problems may be due to physical problems.

The following diagnosed physical/health problem(s) were noted:

(list of physical problems)

The following frequent symptoms were noted:

(list of symptoms)

The student is taking the following medications regularly:

For behavioral control:

(list)

For control of physical/health problems:

(list)

For unknown reasons:

(list)

Home Environment

RC next attempts to determine if problems in the home environment can account for the student's academic problems. It asks if any documented problems such as divorce or death of a family member exist. For each problem noted it assigns a confidence factor of 20. Using special combination rules RC combines the cf 20s for all home problems noted into an overall confidence that learning problems result from problems in the home environment.

Referral Consultant

Culture

Questions and System Rules

RC considers teacher ratings of English proficiency, years of English as a second language instruction (ESL), student ethnic background, the percent of minority students in the school, and years as a resident of the US in arriving at a confidence that learning problems result from cultural differences.

Questions presented and rules for considering the information provided are as follows.

1. In comparison to chronological age peers how would you rate the students' English proficiency?

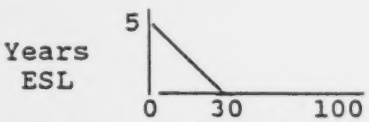
    1. Better than Average (cf -15)
    2. Average (cf 0)
    3. Less than Average (cf 15)

If "Less than Average" (#3) is chosen:

A. Is the primary language used in Dick's non-school environment something other than English?
    1. Yes
    2. No

If "Yes" (#1) is chosen:

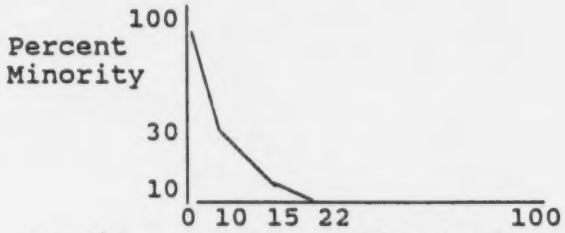
B. How many years of English as a second language instruction has the student had?



Confidence Cultural Effects Learning

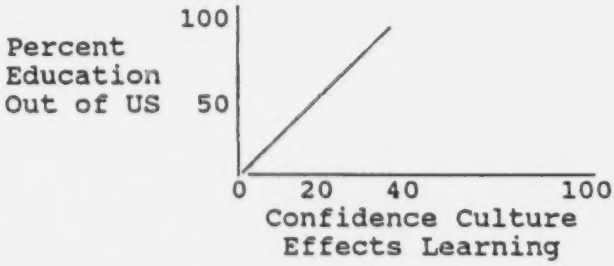
2. What is the student's ethnic background?
    Native American (cf-10)
    Hispanic (cf-6)
    Asian/Pacific Islands (cf-3)
    Other (cf-3)

3. What percent of students in the school belong to the same minority?

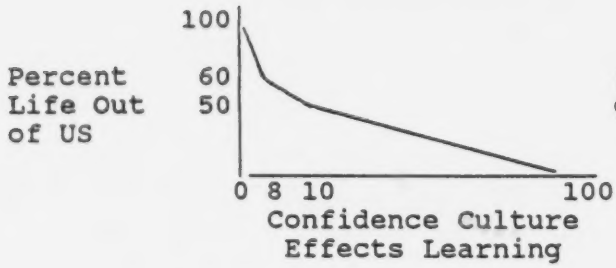


4. How many years has the student been a resident of the US?

5. What is the student's current grade placement?



if years in US <= grade placement



if years in US > grade placement

RC uses special rules to combine the individual confidence factors generated by the rules into an overall confidence that cultural factors are causing learning difficulties.

Referral Consultant

Educational History

Questions and System Rules

RC asks the following questions to determine if certain educational history factors might account for academic problems.

Has Dick experienced any of the following in his educational history. Please enter all that apply.

The student:

1. NONE of the below.
2. has changed schools in the past year or two. (cf 10)
3. has changed schools frequently in academic career. (cf 20)
4. had poor attendance in the past. (cf 20)
5. has experienced a major change in instructional strategy (e.g., from phonic to whole language approach to reading). (cf 20)
6. Other educational history problem.

RC combines the confidence factors shown in parentheses above to arrive at an overall confidence that educational history problems account for the student's learning problems.

If # 8 is chosen, the user is asked to type in the other educational history problem(s). Then a scale is presented on which the user is to rate the impact of "other" problems on the student's learning problems.

The final report states:

Based on the information provided you can be _____ percent certain that the student has learning problems that result from an unusual educational history.

Students whose learning problems are primarily due to an unusual educational history may benefit from remedial instruction or other non-special education services offered by the school district.

Specific educational history problems noted include:
The student:
(list)

Referral Consultant
Final Report

After collecting the information described in the previous sections RC develops a report summarizing the data and its conclusions regarding whether the student should be referred. Sample reports are containing in the Appendix. The report is divided into five sections.

1. Confidence That Student Has Learning Problems

This section presents RC's confidence that the student is experiencing learning difficulties. It is also RC's confidence that the student should be referred for special education assessment or other services. If the user has indicated that there is no reason to believe the student is being impacted by non-special education factors (culture, home environment, or educational history) the RC report indicates that the confidence presented the confidence that the student should be referred for special education assessment. For example:

CONFIDENCE THAT STUDENT HAS LEARNING PROBLEMS

> Based on the information provided you can be 79.0 percent certain that Joe has learning problems.
>
> You can also be 79.0 percent certain Joe should be referred for special education assessment.

If the user has indicated that the student is being impacted by non-special education factors the RC report indicates which factors, it also recommends that information provided in a later section of the report on non-special education causes of learning problems be used to estimate how much confidence can be had that the student should be referred for special education assessment. For example:

CONFIDENCE THAT STUDENT HAS LEARNING PROBLEMS

> Based on the information provided you can be 90.0 percent certain that Dick has learning problems.

Information provided in the section below titled "Possible Non-Special Education Related Causes of Learning Problems" indicates that home environment, culture, and educational history problems may be contributing to Dick's learning problems. This information should be used to estimate how much less than 90.0 percent certain you are that Dick should be referred for special education assessment.

Finally, this section of the report lists, relative to the average student, the percents of skills in math, reading, science, and social studies that have been mastered by the target student.

2. Possible Special Education Related Causes Of Learning Problems

This section of the report presents the confidence that can be had that the student's learning problems may result from behavioral/emotional or physical/health difficulties. Specific problems in these two areas are noted. Also, any medications the student is known to be taking are listed, and any symptoms of possible visual or hearing difficulties are listed.

3. Possible Non-Special Education Related Causes Of Learning Problems

This section of the report lists the confidence that can be had that cultural, home environment or educational history factors are impacting learning. Specific problems in these three areas are noted. Since they are non-special education related causes of learning problems the information provided is helpful in estimating how much learning problems may be accounted for by non-special education factors. For example, consider a student that RC is 90 percent confident he has learning problems. If none of the learning problems result from non-special education factors RC is also 90 percent certain he should be referred for special education assessment. However, suppose that RC also concludes it is 80 percent confident the learning problems result from cultural factors. In this case, most of the learning problems are accounted for by a non-special education factor and the student would not be referred for special education assessment. Rather, a more appropriate referral might be to a multi-cultural program. In this section of the report, when appropriate, RC suggests alternatives to referral for special education assessment.

4. Pre-Referral Interventions

In this section of the report pre-referral interventions attempted to help the student are listed. If none have been tried a statement that without such interventions RC's conclusions are tentative is presented. Also, the suggestion that at least two be tried and another consultation run based on the student's status after appropriate pre-referral interventions is presented.

5. Specific Skills Mastered and Not Mastered

In this section of the report the specific skills the target student has not mastered that the average student in his/her class has mastered are presented. In addition, the skills the target student has mastered that the average student has mastered are presented. These are listed for all areas where the student is experiencing learning difficulties; mathematics, reading, science, and/or social studies.

Appendix B

Referral Consultant Final Report

REFERRAL CONSULTANT REPORT
CONCLUSIONS

Consultation Date:	1/15/91
Student's Name:	Dick Baer
School:	USU Elementary
Grade:	3.5
Age:	9 years 5 months
Teacher's Name:	Toni Casdorph

CONFIDENCE THAT STUDENT HAS LEARNING PROBLEMS

Based on the information provided you can be 73 percent certain that Dick has learning problems.

Information provided in the section below titled "Possible Non-Special Education Related Causes of Learning Problems" indicates that educational history problems may be contributing to Dick's learning problems. This information should be used to estimate how much less than 73 percent certain you are that Dick should be referred for special education assessment.

Compared to the average student in his class Dick has mastered:

100 percent of MATHEMATICS skills

27 percent of READING skills

100 percent of SCIENCE skills

100 percent of SOCIAL STUDIES skills

* *

POSSIBLE SPECIAL EDUCATION RELATED CAUSES OF LEARNING PROBLEMS

BEHAVIOR/SOCIAL-EMOTIONAL:

Based on the information provided you can be
0 percent certain that Dick's learning problems may be due to a behavior disorder/serious-emotional disturbance.

PHYSICAL/HEALTH:

Based on the information provided you can be
20 percent certain that Dick's learning problems may be due to physical problems.

The following diagnosed physical/health problem(s) were noted:
hyperactivity

Dick is taking the following medications regularly:
For behavioral control:
ritalin

VISION:

No symptoms of vision problems have been noted.

HEARING:

No symptoms of hearing problems have been noted.

* *

POSSIBLE NON-SPECIAL EDUCATION RELATED
CAUSES OF LEARNING PROBLEMS

Based on the information provided you can be:

HOME ENVIRONMENT:
---

0 percent certain that Dick has learning problems that result from problems in the home environment.

CULTURE:
---

0 percent certain that Dick has learning problems that result from cultural differences.

EDUCATIONAL HISTORY:
---

10 percent certain that Dick has learning problems that result from an unusual educational history.

Students whose learning problems are primarily due to an unusual educational history may benefit from remedial instruction or other non-special education services.

Educational history problems noted are listed. Dick:
CHANGED SCHOOLS in the PAST YEAR or two.

* *

PRE-REFERRAL INTERVENTIONS

The following pre-referral interventions have been tried with Dick:
after school remedial instruction
peer tutoring

* *

Specific Reading/Language Arts Skills Mastered and Not Mastered

Grade 3 Skills

Dick HAS MASTERED the following skills which the average male student in his class CAN do:

1. Pay attention to the teacher or to others who are speaking or presenting.
2. Follow three- and four-step directions correctly.
3. Tell major points or sequence of events.
4. Respond to speakers, e.g., ask questions and make contributions.
5. React to literary selections read aloud.
6. Recite third grade selections clearly and fluently.
7. Express and support personal opinions about topics presented.
8. Respond to opinions expressed by others.
9. Explain how to do something or tell about an event.
10. Answer questions accurately.

11. Ask appropriate questions when additional information is needed.
12. Build fluency in phonetic and structural analysis skills.
13. Identify the meaning of affixes and root (base) words as they occur in the reading task.

Dick has NOT mastered the following skills which the average male student in his class CAN do:

1. Know the correct meaning of common homonyms in context.
2. Attack multisyllable words systematically, e.g., prefix, root word, ending.
3. Read the sight words and basal vocabulary as they appear in the reading program.
4. Comprehend word, sentence, and paragraph meanings in context.
5. Recognize main ideas in a selection.
6. Alphabetize to the third letter.
7. Read and follow directions.
8. Read a variety of self-selected materials.
9. Retell storylines (plots) in the selections.
10. Predict logical conclusions to events in the selection.
11. Compare characters, events, plots, and settings.
12. Recognize cause and effect relationships.
13. Utilize major spelling generalizations, e.g., same vowel sound/different spellings.
14. Spell a basic word list as adopted by the school.
15. Write words and sentences with correct punctuation and capitalization.
16. Discriminate between correct and incorrect spelling of words on level.
17. Spell homonyms and contractions correctly.
18. Show understanding of spelling words by telling what they mean or using them in a sentence.
19. Use correct formation of all upper and lower case letters and numbers in cursive.
20. Use proper strokes to join letters to form words.
21. Proof and correct their own handwriting.
22. Demonstrate neatness in written work.
23. Generate and organize ideas for writing.
24. Write personal experiences, stories, poetry, etc.
25. Write letters and informative selections.
26. Share and respond to the writing of others.
27. Use capital letters and terminal punctuation.
28. Identify nouns and verbs.
29. Participate in a group improvisation of a story.
30. Stay in character in a short play or skit.
31. Speak expressively in a choral or storytelling situation.
32. Describe the feelings portrayed in a given picture or situation.
33. Identify the setting, plot, and characters in a simple play or story.
34. Demonstrate and discuss appropriate behavior when viewing a performance.
35. Give personal reactions after viewing a performance.
36. Make and/or use simple props or costumes to help portray a character.

Appendix C

Referral Consultant

Easy Reference Guide

Referral Consultant

Easy Reference Guide

Richard Baer, Marilyn Likins, Toni Casdorph,
Brad Althouse and Joseph Ferrara

Technology Division
Developmental Center for Handicapped Persons
Utah State University
Logan, Utah, 1989

Referral Consultant

Welcome to Referral Consultant (RC). This program is designed to help you decide if a student should be referred for special education assessment, or other non-special education services. RC will ask you questions pertaining to a student's academic skills, behavior, sensory ability (vision and hearing), health, home environment, culture, and educational history. It will then use the information to develop a report stating how confident you can be that the student should be referred. The child study team may use this report as an aid in the referral/assessment process.

To run Referral Consultant, you must have an IBM, or an IBM compatible computer with a minimum of 640K memory and two floppy disk drives. A printer is not required, but may be used at the end of the consultation to provide the user with a print-out of the consultation and/or final report.

DATA DISKS:

Before beginning a consultation make sure you have a formatted computer disk. This disk will be used to store a record of the consultation and report for the student being consulted about. To format a new disk use the FORMAT command in the DOS section of this manual.

GETTING STARTED:

There are two ways to start referral consultant:

1. **If your computer is off:** place the RC program disk labeled "Disk A" in the **A** drive and the disk labeled "Disk B" in the **B** drive. If your computer disk drives are side-by-side, the **A** drive is on the **left**. If your computer disk drives are on top of one another, the **A** drive is on the **top**.

   Turn the machine on and the computer will automatically load the program.

2. **If your computer is on and an A> is on the screen:** place the RC program disks in the A and B drives and type **RC**, then hit the enter/return key.

Conducting A Consultation:

After the RC program is loaded, the system will begin to ask you questions about the student. Enter the requested information and then strike the **enter/return** key.

CORRECTING MISTAKES:

There are two ways to correct a mistake:

1. **If you have made an error but have not yet pressed the enter/return key:** simply use the arrow or backspace key to back up and then re-enter your answer.

2. **If you have made an error and pressed the enter/return key:** a menu near the end of the consultation will allow you to correct mistakes in any or all of the main sections of the program. However, demographic information gathered at the beginning of the program (name, date, grade, etc.) cannot be changed. If a mistake is make in entering demographic information the consultation should be restarted.

PROGRAM COMMANDS:

WHY: Typing **why** in response to a question will 1) bring up an explanation of why the question is being asked, and 2) then re-ask the question. For example:

```
Please enter the student's FIRST name.
>>why

The student's name, today's date, and the name of the school
are needed to make a complete record for the consultation.

Please enter the student's FIRST name.
>>Dick
```

UNKNOWN: If you don't know the answer to a question, type the word **unknown** and press the enter/return key. RC accepts this answer, but, lowers the confidence of its conclusions. For example:

```
Which school does Dick Baer currently attend?
>>unknown
```

BACKSLASH \: If your answer will not fit on one line, type a backslash \ at the end of a line, then hit the enter/return key to move to the next line. For example:

```
Enter the quality interventions tried with Dick.
Type a comma between each anger.
>> behavior management programs, a change of classroom\
>> teacher, adjusting curriculum
```

The backslash allows you to extend your answer to the next line.

DATAFILES

Two types of files are automatically created during a consultation.

1. Report	example:	smiraywo.rpt
2. Consultation	example:	smiraywo.log

A filename consists of 8 letters plus type of file:

-the first 3 letters of a student's last name,
-the first 3 letters of a student's first name,
-and the first 2 letters of the school's name.

A filename for Ray Smith, a student at Woodruff Elementary would be **smiraywo.rpt**.

DOS APPLICATIONS:

Drive Commands

Command	Function
A>b: (press return)	Changes disk drive from **A** to **B**
B>a: (press return)	Changes disk drive from **B** to **A**
C>a: (press return)	Changes disk drive from **C** (hard disk) to **A**.

Directory Commands

Command	Function
A> dir (press return)	Calls up the directory for the **A** drive and lists all files.
B> dir (press return)	Calls up the directory for the **B** drive and lists all files.

Format Commands

Command	Function
A> format b: (press return)	**formats** a blank disk in **B** drive.
C> format a: (press return)	**formats** a blank disk in **A** drive.

P R O B L E M A L E R T

When formatting a disk with a hard disk system, be sure to type **a:** after the word **format**. If you forget to type **a:** after the word **format**, you may format your hard disk drive which erases all files on your hard disk. This is a **BIG MISTAKE**. Be careful.

Each time a teacher runs a consultation RC keeps a record of the skills the average male or female student has mastered on the data disk. When the original data disk is filled this record needs to be copied to a new data disk. To do this:

1. Boot up the computer by placing the DOS disk in the A drive and turning it on.
2. Remove the DOS disk.
3. Place the original data disk in the A drive.
4. Place the new data disk in the B drive (this is any blank formatted disk).
5. At the A prompt type in the following:

```
A> copy A:*.??M B: (press return)
        then type in
A> copy A:*.??F B: (press return)
```

Use the new data disk to run additional RC consultations.

Diskcopy

Command	Function
A> diskcopy a:b: (press return)	Copies the contents of the disk in drive A to the disk in drive B.

Print Commands

Command	Function
A> dir>prn (press return)	Sends directory to the printer rather than to the screen.
A> type filename.log>prn (return)	Sends the specific log file to the printer.
A> type filename.rpt>prn (return)	Sends the specific report file to the printer.

Screen Displays

Command	Function
A> type filename.log (press return)	Sends the specific log file to the screen.
A> type filename.rpt (press return)	Sends the specific report file to the screen.

Appendix D

Data Collection Instruments

Informed Consent

Dear Teacher:

During the next two years the Black Hills Special Education Cooperative and Granite School District will be cooperating with the Developmental Center for Handicapped Persons at Utah State University in a research project to investigate the special education referral and placement process. To conduct the research, it will be necessary to collect data on characteristics of students referred for assessment and the teachers. In addition, similar data will be collected on a sample of students not referred. During the first year, the data will be analyzed to determine what student and teacher characteristics are associated with referral. This analysis will provide valuable information about the referral process. In addition, a computer program will be developed to assist teachers in making referrals. During the second year the computer program will be used by teachers at selected schools. Comparisons will be made between schools that have the computer program to assist teachers and those that don't. The comparisons will allow for determining how helpful the program is to teachers and other school personnel.

It is anticipated that the results of the research will have the following benefits:

1. Adding significantly to our knowledge about the special education referral process,

2. Providing teachers and other school personnel with a validated computer program to assist in the referral process,

3. Saving schools time and money by decreasing the number of students referenced for assessment.

For this research to be successful it is important that as many teachers as possible participate. All that is required is that teachers fill out a brief information sheet (copy attached). Identification numbers will be substituted for names of students and teachers to maintain confidentiality. In addition, all information will be held in strictest confidence by the research staff at Utah State University.

If you are willing to participate please sign the lower portion of this form and return it in the enclosed postage paid envelope to the research project staff.

Thank you.

_____ _____

Signature Date

School: _____

Grade Taught: _____

Return to Marilyn Likins at 2528 Beverly Street, SLC, UT 84106

Teacher Questionnaire

Please respond to the questions below and return this questionnaire in the enclosed postage paid envelope to the research project staff. Responses will be kept in strictest confidence.

1. Name: _____ Age: _____

2. School: _____

3. Sex (circle one): Male Female

4. Ethnic Background:
   ____ White
   ____ Black
   ____ Hispanic
   ____ Asian
   ____ Other (please specify): _____

5. Marital Status (circle one): Single Single-Parent
   Married Married-Parent

6. Years of teaching experience: _____

7. How many mainstreamed students with handicaps are in your class? _____

8. How competent do you feel the professionals who receive referrals for special education assessment at your school are (circle one)?

1	2	3	4	5
Completely Incompetent				Extremely Competent

9. How much encouragement to refer students for special education assessment have you been given by the professionals who receive referrals at your school?

1	2	3	4	5
No Encouragement				A Great Deal of Encouragement

10. The training you have received as a teacher enables you to cope adequately with low-IQ children in your class.

1	2	3	4	5
Disagree				Agree

11. The training you have received as a teacher enables you to cope adequately with behavior disordered children in your class.

1	2	3	4	5
Disagree				Agree

12. A low-IQ child is less likely to be adequately prepared for life if he or she is placed in a special class, rather than remaining in your class.

1	2	3	4	5
Disagree				Agree

13. A behavior disordered child is less likely to be adequately prepared for life if he or she is placed in a special class, rather than remaining in your class.

1	2	3	4	5
Disagree				Agree

14. The later a low-IQ child is removed from your class and placed in a special class, the greater will be the benefits to the child.

1	2	3	4	5
Disagree				Agree

15. The later a behavior disordered child is removed from your class and placed in a special class, the greater will be the benefits to the child.

1	2	3	4	5
Disagree				Agree

16. Low-IQ children who attend a special class will be better adjusted socially than children of equal intellectual ability who remain in your class.

1	2	3	4	5
Disagree				Agree

17. Behavior Disordered children who attend a special class will be better adjusted socially than children of equal intellectual ability who remain in your class.

1	2	3	4	5
Disagree				Agree

18. The presence of low-IQ children in your class does not make undue demands on your time.

1	2	3	4	5
Disagree				Agree

19. The presence of behavior disordered children in your class does not make undue demands on your time.

1	2	3	4	5
Disagree				Agree

20. The presence of low-IQ children in your class impedes the progress of other children.

1	2	3	4	5
Disagree				Agree

21. The presence of behavior disordered children in your class impedes the progress of other children.

1	2	3	4	5
Disagree				Agree

22. The lack of equipment and materials available to you in your school does not enable you to cope effectively with low-IQ children in your class.

1	2	3	4	5
Disagree				Agree

23. The lack of equipment and materials available to you in your school does not enable you to cope effectively with behavior disordered children in your class.

1	2	3	4	5
Disagree				Agree

24. Low-IQ children who attend special classes will not attain as high a level of academic achievement as children of equal intellectual ability in your class.

1	2	3	4	5
Disagree				Agree

25. Behavior disordered children who attend special classes will not attain as high a level of academic achievement as children of equal intellectual ability in your class.

1	2	3	4	5
Disagree				Agree

26. Mainstreaming is appropriate for students with mild and moderate handicaps.

1	2	3	4	5
Disagree				Agree

27. Mainstreaming is appropriate for students with severe handicaps.

1	2	3	4	5
Disagree				Agree

28. For each student in your class please respond to the following questions.

Student Number	Does this child usually need considerable teacher supervision during class activities? (circle one)	Please estimate the child's academic potential	How easy is this child to teach?
	1 2 3 4 5 6 Maximum Supervision — Minimum Supervision	1 2 3 4 5 6 Low Potential — High Potential	1 2 3 4 5 6 Difficult to teach — Easy to teach
1	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
2	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
3	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
4	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
5	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
6	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
7	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
8	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
9	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
10	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
11	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
12	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
13	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6

Student Number	Does this child usually need considerable teacher supervision during class activities? (circle one)	Please estimate the child's academic potential	How easy is this child to teach?
	1 2 3 4 5 6 Maximum Supervision Minimum Supervision	1 2 3 4 5 6 Low Potential High Potential	1 2 3 4 5 6 Difficult to teach Easy to teach
14	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
15	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
16	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
17	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
18	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
19	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
20	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
21	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
22	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
23	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
24	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
25	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
26	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
27	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
28	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
29	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
30	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
31	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
32	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
33	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
34	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
35	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6

Referred Student Data

Teacher Data:

1. Name: _____

2. School: _____

3. Sex: Male Female (circle one)

4. Ethnic background:

White: _____
Black: _____
Hispanic: _____
Asian: _____
Other, please specify: _____

5. Marital Status: Single Married (circle one)

6. How many mainstreamed students are in the class the student is being referred from? _____

7. One the scale below please indicate how competent you feel the the assessment team the student is being referred to is. Circle one:

1	2	3	4	5	6
Completely Incompetent					Extremely Competent

8. One the scale below please indicate how you feel about mainstreaming students with handicaps. Circle one:

1	2	3	4	5	6
Not In favor Mainstreaming					Very In Favor Mainstreaming

9. On the scale below please indicate the ability level of the class the student is being referred from. Circle one:

1	2	3	4	5	6
Very Low Ability					Very High Ability

10. On the scale below please indicate how variable the ability level of the class the student being referred from is. Circle one:

1	2	3	4	5	6
Low Variability					High Variability

Student Data

11. Identification Number: _____

12. Sex: Male Female (Circle one)

13. Ethnic Background

White _____
Black _____
Hispanic _____
Asian _____
Other, please specify _____

14. Was this student placed in special education? Yes No (Circle one)

Control Student Data

Teacher Data:

1. Name: _____

2. School: _____

3. Sex: Male Female (circle one)

4. Ethnic background:

White: _____
Black: _____
Hispanic: _____
Asian: _____
Other, please specify: _____

5. Marital Status: Single Married (circle one)

6. How many mainstreamed students are in the class the student is being referred from? _____

7.One the scale below please indicate how competent you feel the the assessment team the student is being referred to is. Circle one:

1	2	3	4	5	6
Completely Incompetent					Extremely Competent

8. One the scale below please indicate how you feel about mainstreaming students with handicaps. Circle one:

1	2	3	4	5	6
Not In favor Mainstreaming					Very In Favor Mainstreaming

9. On the scale below please indicate the ability level of the class the student is being referred from. Circle one:

1	2	3	4	5	6
Very Low Ability					Very High Ability

10. On the scale below please indicate how variable the ability level of the class the student being referred from is. Circle one:

1	2	3	4	5	6
Low Variability					High Variability

Student Data

11. Identification Number: _____

12. Sex: Male Female (Circle one)

13. Ethnic Background

White _____
Black _____
Hispanic _____
Asian _____
Other, please specify _____